Data support for Ecological Site Descriptions: A way forward

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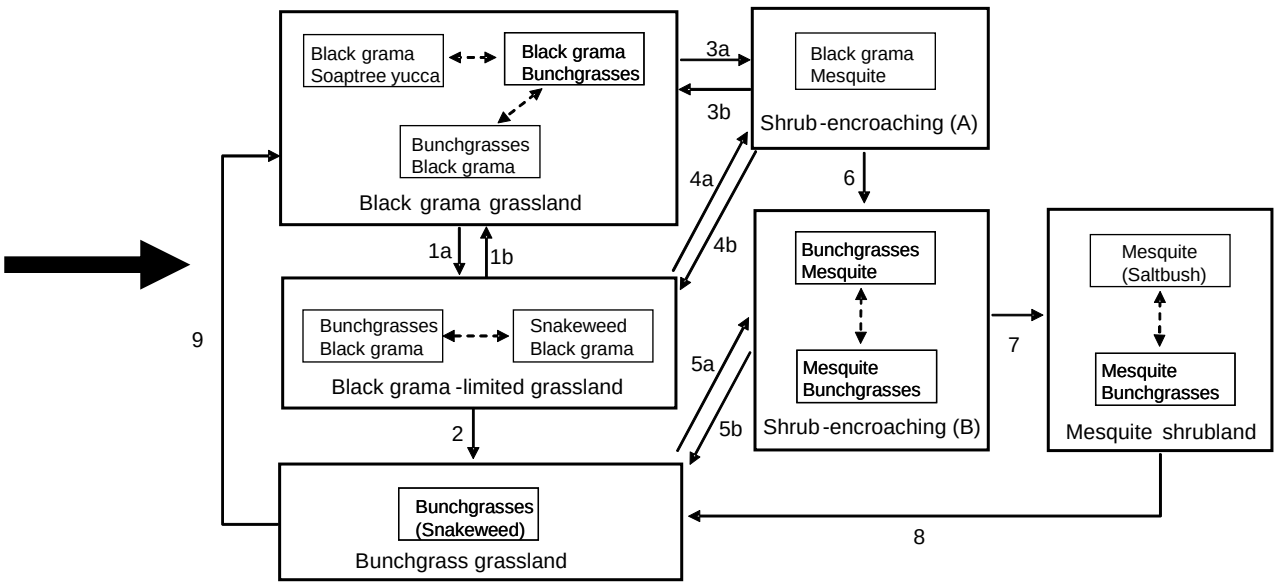
Ecological Site Descriptions link soils to land use and land change

Sandy MLRA 42.2

State-and-transition model: plant communities, DSPs, states



1a. Grazing in drought periods, black grama fragmentation. **1b.** Unknown, possible role for extreme wet periods
2. Black grama extinction due to heavy grazing in drought, soil e rosion.
3a. Mesquite seed introduction with black grama fragmentation, lack of fire. **3b**.Shrub removal
4a, **5a**. Mesquite seed introduction or mesquite release from biological constraint. **4b**, **5b**. Shrub removal
6. Heavy grazing, drought causes black grama extinction, greater opportunities for mesquite expansion, wind erosion/deposition from adjacent shrublands
7. Heavy grazing or ORV disturbance, bunchgrass loss, wind/sheet erosion, soil truncation
8. Mesquite removal coupled to soil stabilization, nutrient addit ion, seeding during wet periods.
9. Unknown, possibly via reseeding in extreme wet periods

Climate
Geology
Landform
Hydrology
Soil profile

Interpretations

Ecological Site Descriptions need quality data

- **Existing ESDs are a great start:**

  - Capture expert knowledge

  - Synthesize ideas

  - Characterize representative (reference) states in detail

- **But ESDs are often not clear or supported by data:**

  - Unclear criteria for ecological sites

  - Soil-site correlation not adequately tested, often fails

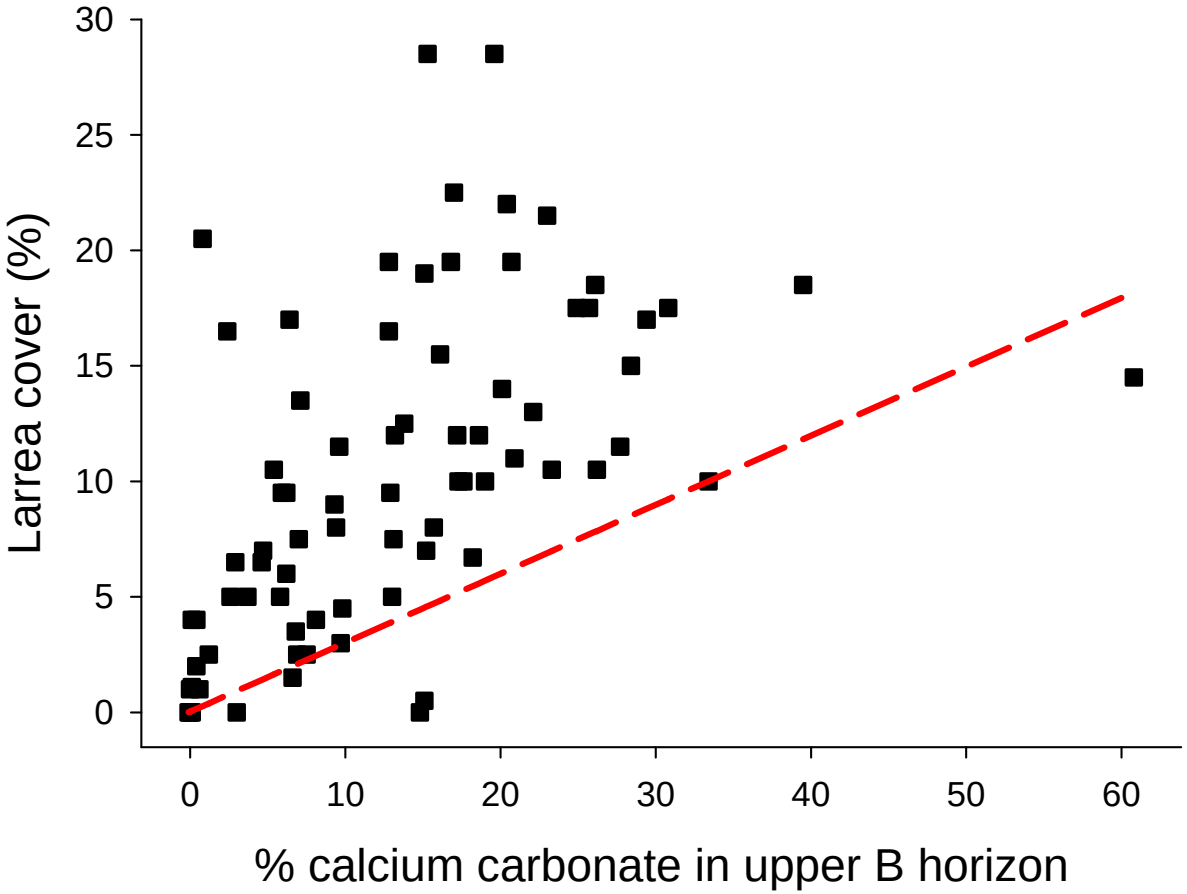
  - Soil-“state” correlation not tested either, often fails

A way forward

Gather data for a statistical and inquiry-based approach:

- **Sampling that reflects the spatial extent of the ESD**
- **Sampling that varies in detail (balance regional replication/ representation with point-level precision)**
- **Use different kinds of data to ask different questions**

Why do we need datasets for ESD development?



This dataset bucks conventional wisdom about the Gravelly ecological site

Isn’t this just splitting hairs?

No.

- **Inappropriate evaluation of historical and future potential**
- **Wasted resources on brush control**

A strategy for ESD development in soil survey

1) Initial concepts (initial ESDs and STM reports)
2) Extensive-low-intensity reconnaissance
3) Stratify the region, identify patterns, locate reference areas
4) Stratified medium-intensity inventory
5) Database storage for BOTH soils and vegetation data
6) Data analysis
7) Refine and quantify ecological site, state, map unit concepts
8) High intensity characterization of states (ESIS)

Three tiers of data support

Tier 1: Low-intensity, extensive survey (traverse)

- **Extensive data on relationships among states, soil taxa, landforms, climate, and land-uses across the MLRA or LRU (15-30 minutes/point).**
- **Concept development, hypothesis development, soil-site (state) correlation**

Tier 2: Medium-intensity inventory (transecting or stratified inventory)

- **Quantitative descriptions of vegetation and soils at stratified-random points (2-3 hours/point)**
- **Statistical relationships between the properties of states and soils/landforms**

Tier 3: High intensity characterization

- **Detailed quantification of vegetation, dynamic soil properties, and soil profile properties for representatives of alternative states, particularly the reference state. (1+ days/point)**
- **Integrated properties of states and tests of mechanisms postulated in STMs**

Tier 1-Low intensity traverse

ESD Traverse Data Form

Site:	State:	County:	MLRA:	LRU:
Investigators:	Date:	Location:		

WP	Elev	Slope (%)	Aspect (°)	Top depth (cm)	Bot-tom depth (cm)	% GR	Texture or Horizon	Eff	Ecological Site	List Dominant Plants in Order	Cover class	Dom Shrub/ Tree Ht.	Pedoderm Class	Resource Retention Class	Soil Redistri-bution Class	State / Plant Community	Notes
										1							
										2							
										3							
										4							
										5				___ cm			
										1							
										2							
										3							
										4							
										5				___ cm			

E.g., 100+ points *across the MLRA*, geodatabased

The one opportunity to gather observations across the region

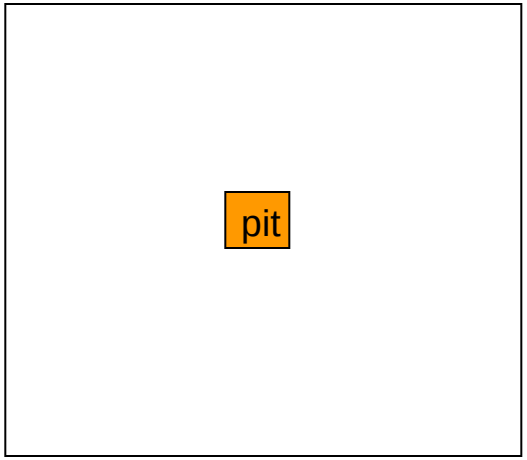
Use to answer: “Where am I going to do medium-intensity sampling?”

Tier 2-Medium-intensity inventory

Modified Domin-Krajina cover estimate in 20x20 m plot

+--few	1--<0.1%	2--<1%	3--1-4%	4--5-10%	5--10-25%	6--25-33%	7--33-50%	8--50-75%	9--> 75%
+--<0.2m2	1--0.2-0.5m2	2--0.5-4m2	3--4-20m2	4--20-40m2	5--40-100 m2	6--100-132 m2	7--132-200	8-200-300	9--300-380

Woody	Class	**Grass**	Class	**Forb**	Class	**Other**	Class		
						Litter			Percent
						Cryptogram			Scale



20 m

= 1/10th acre plot

1. Soil form (mini-pit)

2. Vegetation form
   - -cover (above)
   - -production estimates

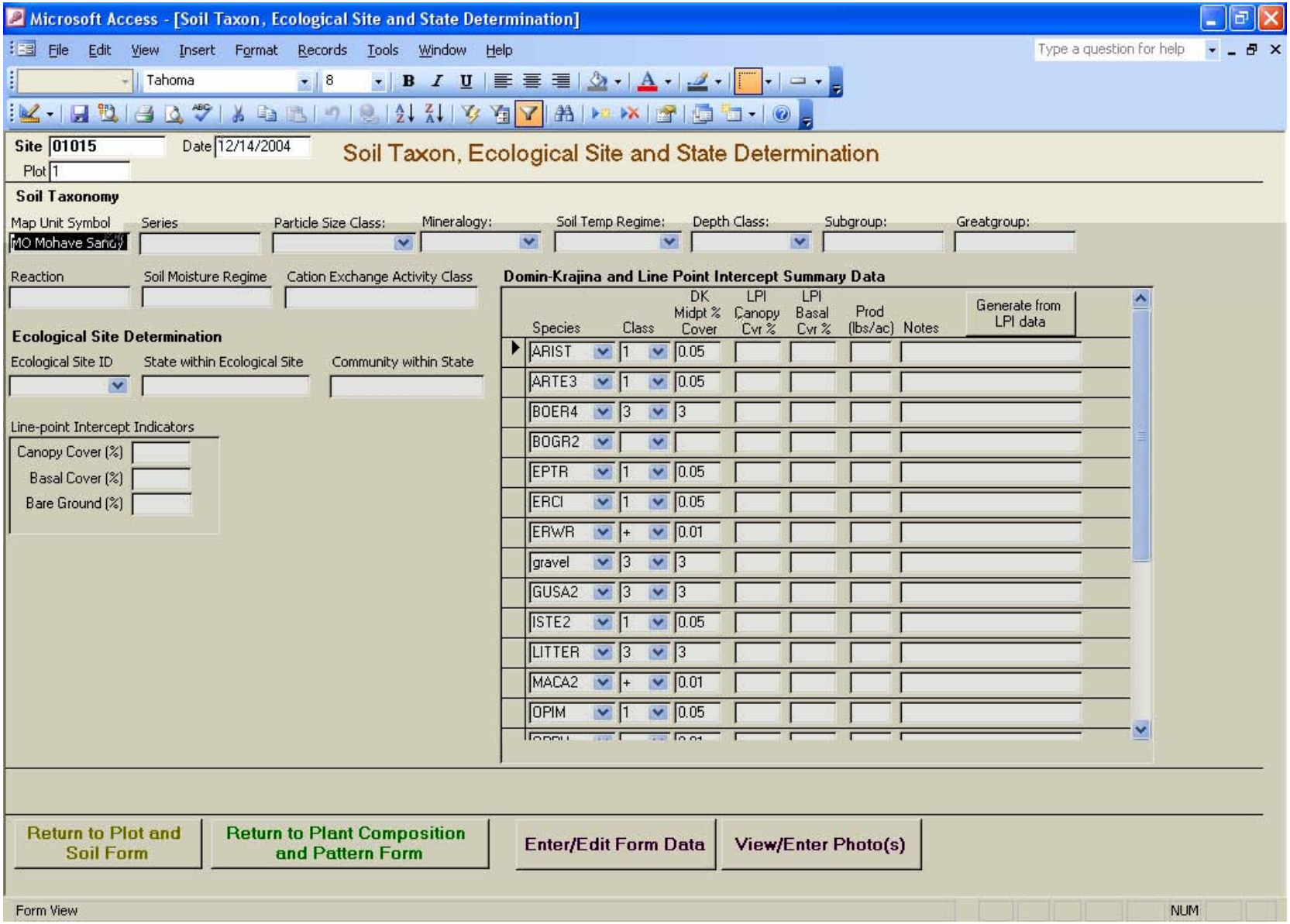
3. Pedoderm form (workshop 2 materials)

10-30 points each for dominant ecological sites (rare ones may be too rare)

Tier 2-Medium-intensity inventory

Stratification along soil gradients, land-use differences

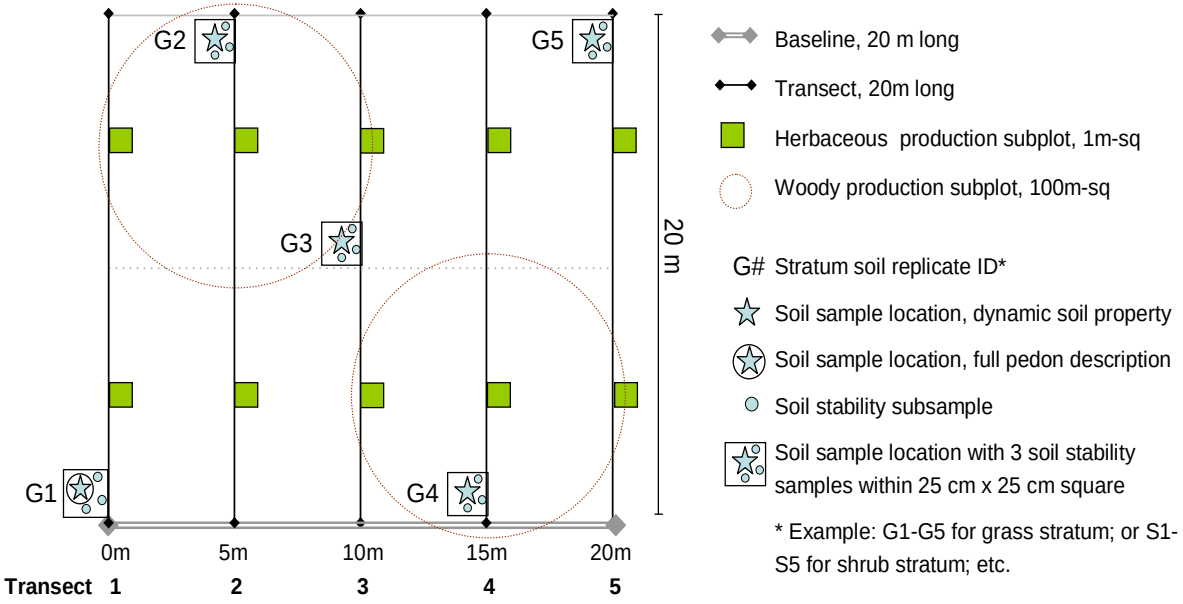
Storage of plant and soil data in a single database



http://usda-ars.nmsu.edu/monit_assess/rangedb_main.php

High-intensity characterization of states and phases (especially reference) within “benchmark” ecological sites

20m x 20m plot, one stratum, five soil subsamples



All sites need soil 232s (but all pits need high intensity characterization): need to sample often rare reference conditions within the site concept

3+ samples per state per ecological site

Data elements and standards for ESDs

Ecological site

***Soil diagnostic features*: Soil/landform/hydrological features that distinguish an ecological site from ALL others**

→ low and medium intensity data

***Soil map unit components*: Components correlated to site**

→ low intensity data

State-and-transition model

***Diagnosis for states:* Properties that distinguish states in the STM**

→ medium and high intensity data

***Properties of states*: Cover, production, composition, bulk density, soil aggregate stability, etc.**

→ high intensity data